

1. Advanced Technology for ES

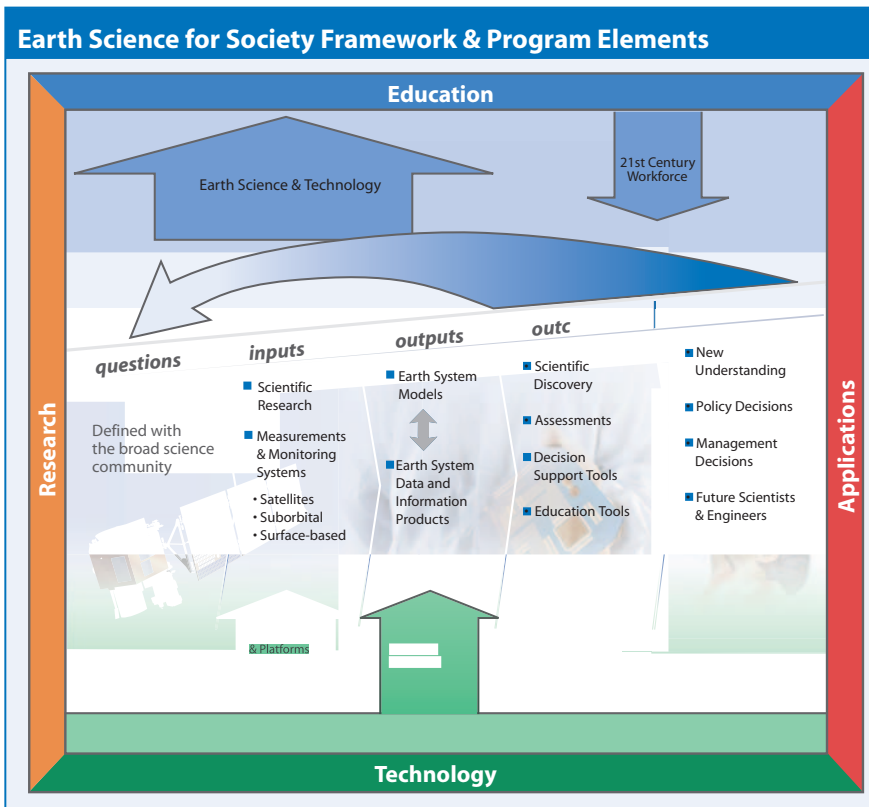
1.1. The Earth Science Mission

The mission of the Earth-Sun System Division (the Division) of NASA's Science Mission Directorate is to understand and protect our home planet by using a view from space to study the Earth-Sun system and improve predictions of Earth-system change. The Division's science and applications programs pursue the long-term goal of understanding Earth and its environment as a global system, with the concomitant ability of applying this knowledge for predicting the future behavior of our global ecosystem. NASA has a distinctive role in this national endeavor because it employs the unique vantage point of space to provide information that is obtainable in no other way. Our research programs study the interactions between the atmosphere, oceans, continents, and life to increase our knowledge of the Earth's system with an emphasis on understanding global-climate change.

The Division conducts four basic activities including a **research** program to increase our knowledge of the Earth system, an **applications** program to demonstrate practical use of Earth-system information for planners and decision-makers in government; business; and the public, and a **technology** program to enable new capabilities for future study of the Earth system. NASA's unique capabilities in space-based and suborbital observing systems, information systems, global modeling, and decision-support systems integration combine to provide continuing advances in these three areas. Also, the Division conducts an **education** program that shares the discoveries and knowledge gained from Division programs with the public to enhance science; mathematics; and technology education, and to inspire future generations of Americans.

The Division has a supporting role in NASA's mission to explore the universe and to search for life. Earth Science (ES) research and knowledge of Earth's processes

provide a model for the study and understanding of other planets. In this arena, the Division has developed unique capabilities for the design and development of systems that conduct remote and in-situ observations; support data analysis and management; and perform numerical modeling of planetary processes, and these capabilities serve as precursors for those to be deployed elsewhere in the solar system.



The basic **science for society** framework is shown with the four major elements required to achieve Division objectives in the perimeter. The strategic approach to implementation of these four elements is described in NASA's Earth Science Strategy Document.

1.2. Role of the Technology Program

Technology plays a major role in shaping the fundamental ES research and applied capabilities of the future. Advanced technologies make possible space-based measurements that provide greater insight into how the Earth system works. Additionally, these technologies contribute to terrestrial applications that benefit the public; industry; and government, thus serving our national interests well. Sustained technology advancements support Division goals on two crucial areas:

- They enable previously unforeseen or unfeasible science investigations; and,
- They enhance existing measurement capabilities by reducing their cost, risk, or development times.

The Division's Technology Program (the Program) was established in response to a 1997 ES Biannual Review to ensure that a continuous, well-focused effort addresses crucial Division technology needs while maximizing return on investment of technology dollars. The goal of the Program is to **foster the creation and infusion of new technologies into Earth-science missions.**

This document outlines the planning and implementation guidelines we have established to meet the goal of developing technology investments that best support Division objectives. The **Earth Science Technology Plan 2004** is an extension of the Earth-Sun System's Strategic Plan and will be updated as research priorities, program needs, and the overall technology program evolves.



The powers of remote sensing and computer visualization technologies combine to allow views of Earth that are otherwise impossible to obtain. This image of the earth disk over Antarctica is a composite of data from several generations of remote sensing satellites. AVHRR data was used for the land, SeaWiFS data for the oceans, and the clouds are a combination of TERRA's MODIS images over the poles and NOAA weather satellite data for the mid and low latitudes.

Image credit: Marit Jentoft-Nilsen, NASA/GSFC Image Visualization Laboratory. Using data from NASA and NOAA satellites.